

WHAT IS CLAIMED IS

1 1. A GFP (Generic Frame Procedure) frame transfer apparatus  
2 for transferring a GFP frame, comprising a GFP path frame  
3 formation section that stores a label corresponding to a path  
4 ID defined to uniquely specify the path from the Ingress node  
5 to Egress node within a GFP network made up of a plurality  
6 of GFP nodes in a predetermined field of the extension header  
7 area of said GFP frame, stores packets to be transferred through  
8 said path in the payload field of said GFP frame and forms  
9 a GFP path frame.

1 2. The GFP frame transfer apparatus according to claim 1,  
2 wherein the length of said extension header area in said GFP  
3 path frame is 16 bits.

1 3. The GFP frame transfer apparatus according to claim 1,  
2 wherein said extension header area comprises a label field  
3 to store said label, a DE (Discard Eligibility) field to store  
4 a flag to indicate priority of discarding said GFP path frame  
5 and a reserved field for reservation.

1 4. The GFP frame transfer apparatus according to claim 3,  
2 wherein the size of said label field is 11 bits, the size of  
3 said DE field is 1 bit and the size of said reserved field  
4 is 4 bits.

1 5. The GFP frame transfer apparatus according to claim 1,  
2 further comprising a packet extraction section that terminates  
3 a frame of the subnetwork that stores a packet to be stored  
4 in said payload field of said GFP path frame and extracts said  
5 packet from the frame of said subnetwork.

1 6. The GFP frame transfer apparatus according to claim 5,  
2 wherein said packet extraction section extracts said packet  
3 by removing unnecessary overhead for said subnetwork from the  
4 frame of said subnetwork.

1 7. The GFP frame transfer apparatus according to claim 5,  
2 wherein said GFP path frame formation section specifies said  
3 label corresponding to said path ID on said GFP network based  
4 on routing information stored in said packet.

1 8. The GFP frame transfer apparatus according to claim 5,  
2 wherein said GFP path frame formation section specifies said  
3 label corresponding to said path ID on said GFP network based  
4 on routing information stored in said packet and the input  
5 port when said packet is input to said GFP frame transfer  
6 apparatus.

1 9. The GFP frame transfer apparatus according to claim 7,  
2 wherein said packet is an Ethernet MAC frame and said routing  
3 information is a DA (Destination Address) stored in said  
4 Ethernet MAC frame.

1 10. The GFP frame transfer apparatus according to claim 7,  
2 wherein said packet is an IP packet and said routing information  
3 is a DA (Destination Address) stored in said IP packet.

1 11. The GFP frame transfer apparatus according to claim 1,  
2 further comprising a GFP path frame transmission section that  
3 stores said GFP path frame formed by said GFP path frame  
4 formation section in the layer 1 frame which is the first layer  
5 frame of the OSI reference model that accommodates said GFP  
6 frame in said GFP network and sends said layer 1 frame storing  
7 said GFP path frame from the output port corresponding to said  
8 label of said GFP frame transfer apparatus to said GFP network.

1 12. The GFP frame transfer apparatus according to claim 1,  
2 further comprising a label switching section that identifies,  
3 when said GFP frame transfer apparatus receives said GFP path  
4 frame from said GFP network, the output port of said GFP frame  
5 transfer apparatus corresponding to said label stored in said  
6 extension header area of said GFP path frame and switches said  
7 GFP path frame to said identified output port so that said  
8 GFP path frame is sent to said GFP network through the  
9 transmission path connected to said identified output port.

1 13. The GFP frame transfer apparatus according to claim 5,  
2 wherein said subnetwork is Ethernet.

1 14. The GFP frame transfer apparatus according to claim 13,  
2 wherein said packet extraction section extracts said packet  
3 from the payload of the Ethernet frame of said Ethernet.

1 15. The GFP frame transfer apparatus according to claim 5,  
2 wherein said subnetwork is a POS (Packet Over SONET).

1 16. The GFP frame transfer apparatus according to claim 15,  
2 wherein said packet extraction section extracts said packet  
3 from the payload of the HDLC frame of said POS.

1 17. A GFP (Generic Frame Procedure) frame transfer apparatus  
2 for transferring a GFP frame, comprising:

3 a GFP path frame reception section that stores a label  
4 corresponding to a path ID defined to uniquely specify the  
5 path from the Ingress node to Egress node within a GFP network  
6 made up of a plurality of GFP nodes in a predetermined field  
7 of the extension header area and receives the GFP path frame  
8 that stores the packet to be transferred through said path  
9 in the payload field from said GFP network;

10 a label switching section that identifies the output port  
11 of said GFP frame transfer apparatus corresponding to said  
12 label stored in said extension header area of said GFP path  
13 frame and switches said GFP path frame to said identified output  
14 port so that said GFP path frame is sent to said GFP network  
15 through the transmission path connected to said identified  
16 output port; and

17 a GFP path frame transmission section that transmits said  
18 GFP path frame switched by said label switching section from  
19 said identified output port to said GFP network.

1 18. The GFP frame transfer apparatus according to claim 17,  
2 wherein the length of said extension header area in said GFP  
3 path frame is 16 bits.

1 19. The GFP frame transfer apparatus according to claim 17,  
2 wherein said extension header area comprises a label field  
3 to store said label, a DE (Discard Eligibility) field to store  
4 a flag to indicate priority of discarding said GFP path frame  
5 and a reserved field for reservation.

1 20. The GFP frame transfer apparatus according to claim 19  
2 wherein the size of said label field is 11 bits, the size of  
3 said DE field is 1 bit and the size of said reserved field  
4 is 4 bits.

1 21. The GFP frame transfer apparatus according to claim 17,  
2 the GFP path frame transmission section stores said GFP path  
3 frame in a layer 1 frame which is the first layer frame of  
4 an OSI reference model accommodating said GFP path frame in  
5 said GFP network and sends said layer 1 frame storing said  
6 GFP path frame to said GFP network.

1 22. The GFP frame transfer apparatus according to claim 11,  
2 wherein a SONET (Synchronous Optical NETwork) is used as the  
3 first layer of said OSI reference model.

1 23. The GFP frame transfer apparatus according to claim 22,  
2 wherein said GFP path frame transmission section stores said  
3 GFP path frame in the payload of the SONET frame of said SONET  
4 and sends said SONET frame storing said GFP path frame to said  
5 GFP network.

1 24. The GFP frame transfer apparatus according to claim 11,  
2 wherein an OTN (Optical Transport Network) is used as the first  
3 layer of said OSI reference model.

1 25. The GFP frame transfer apparatus according to claim 24,  
2 wherein said GFP path frame transmission section stores said  
3 GFP path frame in an OPuk (Optical channel payload unit) which  
4 is the payload of the digital wrapper frame of said OTN and  
5 sends said digital wrapper frame that stores said GFP path  
6 frame to said GFP network.

1 26. The GFP frame transfer apparatus according to claim 12,  
2 wherein said label switching section rewrites said label  
3 corresponding to said path ID stored in said extension header  
4 area according to a predetermined rule.

1 27. A GFP (Generic Frame Procedure) frame transfer method  
2 for transferring a GFP frame, comprising a GFP path frame  
3 forming step of storing a label corresponding to a path ID  
4 defined to uniquely specify the path from the Ingress node  
5 to Egress node within a GFP network made up of a plurality  
6 of GFP nodes in a predetermined field of the extension header  
7 area of said GFP frame, storing packets to be transferred  
8 through said path in the payload field of the said GFP frame  
9 and forming a GFP path frame.

1 28. The GFP frame transfer method according to claim 27,  
2 wherein the length of said extension header area in said GFP  
3 path frame is 16 bits.

1 29. The GFP frame transfer method according to claim 27,  
2 wherein said extension header area comprises a label field  
3 to store said label, a DE (Discard Eligibility) field to store  
4 a flag to indicate priority of discarding said GFP path frame  
5 and a reserved field for reservation.

1 30. The GFP frame transfer method according to claim 29,  
2 wherein the size of said label field is 11 bits, the size of  
3 said DE field is 1 bit and the size of said reserved field  
4 is 4 bits.

1 31. The GFP frame transfer method according to claim 27,  
2 further comprising a packet extracting step of terminating

3 a frame of the subnetwork that stores a packet to be stored  
4 in said payload field of said GFP path frame and extracting  
5 said packet from the frame of said subnetwork.

1 32. The GFP frame transfer method according to claim 31,  
2 wherein in said packet extracting step said packet is extracted  
3 by removing unnecessary overhead for said subnetwork from the  
4 frame of said subnetwork.

1 33. The GFP frame transfer method according to claim 31,  
2 wherein in said GFP path frame forming step said label  
3 corresponding to said path ID on said GFP network is specified  
4 based on routing information stored in said packet.

1 34. The GFP frame transfer method according to claim 31,  
2 wherein in said GFP path frame forming step said label  
3 corresponding to said path ID on said GFP network is specified  
4 based on routing information stored in said packet and the  
5 input port when said packet is input to said GFP frame transfer  
6 apparatus.

1 35. The GFP frame transfer method according to claim 33,  
2 wherein said packet is an Ethernet MAC frame and said routing  
3 information is a DA (Destination Address) stored in said  
4 Ethernet MAC frame.



1 36. The GFP frame transfer method according to claim 33,  
2 wherein said packet is an IP packet and said routing information  
3 is a DA (Destination Address) stored in said IP packet.

1 37. The GFP frame transfer method according to claim 27,  
2 further comprising a GFP path frame transmitting step of  
3 storing said GFP path frame formed in said GFP path frame forming  
4 step in the layer 1 frame which is the first layer frame of  
5 the OSI reference model that accommodates said GFP frame on  
6 said GFP network and sending said layer 1 frame storing said  
7 GFP path frame from the output port corresponding to said label  
8 of said GFP frame transfer apparatus to said GFP network.

1 38. The GFP frame transfer method according to claim 27,  
2 further comprising a label switching step of identifying, when  
3 said GFP frame transfer apparatus receives said GFP path frame  
4 from said GFP network, the output port of said GFP frame transfer  
5 apparatus corresponding to said label stored in said extension  
6 header area of said GFP path frame and switching said GFP path  
7 frame to said identified output port so that said GFP path  
8 frame is sent to said GFP network through the transmission  
9 path connected to said identified output port.

1 39. The GFP frame transfer method according to claim 31,  
2 wherein said subnetwork is Ethernet.

1 40. The GFP frame transfer method according to claim 39,  
2 wherein in said packet extracting step said packet is extracted  
3 from the payload of the Ethernet frame of said Ethernet.

1 41. The GFP frame transfer method according to claim 31,  
2 wherein said subnetwork is a POS (Packet Over SONET).

1 42. The GFP frame transfer method according to claim 41,  
2 wherein in said packet extracting step said packet is extracted  
3 from the payload of the HDLC frame of said POS.

1 43. A GFP (Generic Frame Procedure) frame transfer method  
2 for transferring a GFP frame, comprising:

3 a GFP path frame receiving step of storing a label  
4 corresponding to a path ID defined to uniquely specify the  
5 path from the Ingress node to Egress node within a GFP network  
6 made up of a plurality of GFP nodes in a predetermined field  
7 of the extension header area and receiving the GFP path frame  
8 that stores the packet to be transferred through said path  
9 in the payload field from said GFP network;

10 a label switching step of identifying the output port  
11 corresponding to said label stored in said extension header  
12 area of said GFP path frame and switching said GFP path frame  
13 to said identified output port so that said GFP path frame  
14 is sent to said GFP network through the transmission path  
15 connected to said identified output port; and

16 a GFP path frame transmitting step of transmitting said  
17 GFP path frame switched in said label switching step from said  
18 identified output port to said GFP network.

1 44. The GFP frame transfer method according to claim 43,  
2 wherein the length of said extension header area in said GFP  
3 path frame is 16 bits.

1 45. The GFP frame transfer method according to claim 43,  
2 wherein said extension header area comprises a label field  
3 to store said label, a DE (Discard Eligibility) field to store  
4 a flag to indicate priority of discarding said GFP path frame  
5 and a reserved field for reservation.

1 46. The GFP frame transfer method according to claim 45,  
2 wherein the size of said label field is 11 bits, the size of  
3 said DE field is 1 bit and the size of said reserved field  
4 is 4 bits.

1 47. The GFP frame transfer method according to claim 43,  
2 wherein in said GFP path frame transmitting step, said GFP  
3 path frame is stored in the layer 1 frame which is the first  
4 layer frame of the OSI reference model that accommodates said  
5 GFP frame on said GFP network and said layer 1 frame storing  
6 said GFP path frame is sent to said GFP network.

1 48. The GFP frame transfer method according to claim 37,  
2 wherein a SONET (Synchronous Optical NETwork) is used as the  
3 first layer of said OSI reference model.

1 49. The GFP frame transfer method according to claim 48,  
2 wherein in said GFP path frame transmitting step, said GFP  
3 path frame is stored in the payload of the SONET frame of said  
4 SONET and said SONET frame storing said GFP path frame is sent  
5 to said GFP network.

1 50. The GFP frame transfer method according to claim 37,  
2 wherein an OTN (Optical Transport Network) is used as the first  
3 layer of said OSI reference model.

1 51. The GFP frame transfer method according to claim 50,  
2 wherein in said GFP path frame transmitting step, said GFP  
3 path frame is stored in an OPUk (Optical channel payload unit)  
4 which is the payload of the digital wrapper frame of said OTN  
5 and said digital wrapper frame that stores said GFP path frame  
6 is sent to said GFP network.

1 52. The GFP frame transfer method according to claim 38,  
2 wherein in said label switching step, said label corresponding  
3 to said path ID stored in said extension header area is rewritten  
4 according to a predetermined rule.